

Ultrafast X-ray Science at the Advanced Light Source

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An important research frontier is the application of x-ray techniques such as diffraction and EXAFS to investigate structural dynamics (atomic motion and the making and breaking of chemical bonds) which drive phase transitions in solids, chemical reactions, and rapid biological processes. The fundamental time scale for such processes is an atomic vibrational period, ~ 100 fs, which is nearly three orders of magnitude beyond the present capabilities of synchrotrons. We have recently generated <150 fs synchrotron pulses from the Advanced Light Source using ultrashort laser pulses to manipulate the stored electron beam. We are presently developing a bend-magnet beamline with 100 fs time resolution for ultrafast x-ray science, and have proposed a femtosecond undulator beamline for the ALS. This poster will describe the techniques used in generating femtosecond x-rays from a synchrotron and will provide an overview of the research program in ultrafast x-ray science that is being developed at the ALS.